

**FORSPAN ASSESSMENT MODEL FOR CONTINUOUS
ACCUMULATIONS--BASIC INPUT DATA FORM (NOGA, Version 9, 2-10-03)**

IDENTIFICATION INFORMATION

Assessment Geologist:	M.E. Brownfield	Date:	24-Feb-09
Region:	North America	Number:	5
Province:	Western Oregon-Washington	Number:	5004
Total Petroleum System:	Tertiary Coalbed Gas	Number:	500403
Assessment Unit:	Eocene Coalbed Gas	Number:	50040381
Based on Data as of:	IHS Energy well data (2008)		
Notes from Assessor:			

CHARACTERISTICS OF ASSESSMENT UNIT

Assessment-unit type: Oil (<20,000 cfg/bo) or Gas (≥20,000 cfg/bo), incl. disc. & pot. additions Gas

What is the minimum total recovery per cell? 0.02 (mmbo for oil A.U.; bcfg for gas A.U.)

Number of tested cells: 30

Number of tested cells with total recovery per cell ≥ minimum: 0

Established (discovered cells): Hypothetical (no cells): X

Median total recovery per cell (for cells ≥ min.): (mmbo for oil A.U.; bcfg for gas A.U.)

1st 3rd discovered 2nd 3rd 3rd 3rd

Assessment-Unit Probabilities:

Attribute	Probability of occurrence (0-1.0)
1. CHARGE: Adequate petroleum charge for an untested cell with total recovery ≥ minimum.	<u>1.0</u>
2. ROCKS: Adequate reservoirs, traps, seals for an untested cell with total recovery ≥ minimum.	<u>1.0</u>
3. TIMING: Favorable geologic timing for an untested cell with total recovery ≥ minimum.	<u>1.0</u>
Assessment-Unit GEOLOGIC Probability (Product of 1, 2, and 3):	<u>1.0</u>

NO. OF UNTESTED CELLS WITH POTENTIAL FOR ADDITIONS TO RESERVES

- Total assessment-unit area (acres): (uncertainty of a fixed value)
calculated mean 11,068,333 minimum 9,905,000 mode 11,095,000 maximum 12,205,000
- Area per cell of untested cells having potential for additions to reserves (acres): (values are inherently variable)
calculated mean 100 minimum 40 mode 80 maximum 180
uncertainty of mean: minimum 60 maximum 140
- Percentage of total assessment-unit area that is untested (%): (uncertainty of a fixed value)
calculated mean 100 minimum 100 mode 100 maximum 100

Assessment Unit (name, no.)
Eocene Coalbed Gas, 50040381

**NO. OF UNTESTED CELLS WITH POTENTIAL FOR ADDITIONS TO RESERVES
(Continued)**

4. Percentage of untested assessment-unit area that has potential for additions to reserves (%):
(a necessary criterion is that total recovery per cell \geq minimum; uncertainty of a fixed value)

calculated mean 8.7 minimum 1 mode 3.1 maximum 22

Geologic evidence for estimates:

There are Eocene age coals throughout this AU with 4 areas (Bellingham, Southeastern Puget Lowlands, Cowlitz-Spencer, and Coos Bay) that account for about 18.5 percent of the total AU. These areas contain thick coals and coalbed methane is known to be present in all areas. Torrent Energy estimates that the Coos Bay area contains 1.2 TCF coal gas with about 580 BCF of gas at a depth less than 4000 ft.

TOTAL RECOVERY PER CELL

Total recovery per cell for untested cells having potential for additions to reserves:
(values are inherently variable; mmbo for oil A.U.; bcfg for gas A.U.)

calculated mean 0.15 minimum 0.02 median 0.1 maximum 2

AVERAGE COPRODUCT RATIOS FOR UNTESTED CELLS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

<u>Oil assessment unit:</u>	minimum	mode	maximum
Gas/oil ratio (cfg/bo)	<u> </u>	<u> </u>	<u> </u>
NGL/gas ratio (bnl/mmcfg)	<u> </u>	<u> </u>	<u> </u>

<u>Gas assessment unit:</u>			
Liquids/gas ratio (bliq/mmcfg)	<u>0</u>	<u>0</u>	<u>0</u>

SELECTED ANCILLARY DATA FOR UNTESTED CELLS

(values are inherently variable)

<u>Oil assessment unit:</u>	minimum	mode	maximum
API gravity of oil (degrees)	<u> </u>	<u> </u>	<u> </u>
Sulfur content of oil (%)	<u> </u>	<u> </u>	<u> </u>
Depth (m) of water (if applicable)	<u> </u>	<u> </u>	<u> </u>

Drilling depth (m)

minimum	F75	mode	F25	maximum
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

<u>Gas assessment unit:</u>	minimum	mode	maximum
Inert-gas content (%)	<u>0.01</u>	<u>0.30</u>	<u>2.00</u>
CO ₂ content (%)	<u>0.01</u>	<u>1.80</u>	<u>8.00</u>
Hydrogen sulfide content (%)	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>
Heating value (BTU)	<u>850</u>	<u>950</u>	<u>1050</u>
Depth (m) of water (if applicable)	<u> </u>	<u> </u>	<u> </u>

Drilling depth (m)

minimum	F75	mode	F25	maximum
<u>152</u>	<u> </u>	<u>305</u>	<u> </u>	<u>1900</u>

<u>Success ratios:</u>	calculated mean	minimum	mode	maximum
Future success ratio (%)	<u>28</u>	<u>10</u>	<u>25</u>	<u>50</u>

Historic success ratio, tested cells (%)

Completion practices:

1. Typical well-completion practices (conventional, open hole, open cavity, other)
2. Fraction of wells drilled that are typically stimulated
3. Predominant type of stimulation (none, frac, acid, other)
4. Fraction of wells drilled that are horizontal

ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO STATES
Surface Allocations (uncertainty of a fixed value)

1. <u>Oregon</u>	represents	<u>57.42</u>	area % of the AU
<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in Gas Accumulations:</u>			
Volume % in entity	<u> </u>	<u>57.42</u>	<u> </u>
2. <u>Washington</u>	represents	<u>42.58</u>	area % of the AU
<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in Gas Accumulations:</u>			
Volume % in entity	<u> </u>	<u>42.58</u>	<u> </u>
3. <u> </u>	represents	<u> </u>	area % of the AU
<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in Gas Accumulations:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
4. <u> </u>	represents	<u> </u>	area % of the AU
<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in Gas Accumulations:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
5. <u> </u>	represents	<u> </u>	area % of the AU
<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in Gas Accumulations:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
6. <u> </u>	represents	<u> </u>	area % of the AU
<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in Gas Accumulations:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>

7. _____ represents _____ area % of the AU

<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	_____	_____	_____

<u>Gas in gas assessment unit:</u>			
Volume % in entity	_____	_____	_____

8. _____ represents _____ area % of the AU

<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	_____	_____	_____

<u>Gas in gas assessment unit:</u>			
Volume % in entity	_____	_____	_____

9. _____ represents _____ area % of the AU

<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	_____	_____	_____

<u>Gas in gas assessment unit:</u>			
Volume % in entity	_____	_____	_____

10. _____ represents _____ area % of the AU

<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	_____	_____	_____

<u>Gas in gas assessment unit:</u>			
Volume % in entity	_____	_____	_____

11. _____ represents _____ area % of the AU

<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	_____	_____	_____

<u>Gas in gas assessment unit:</u>			
Volume % in entity	_____	_____	_____

12. _____ represents _____ area % of the AU

<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	_____	_____	_____

<u>Gas in gas assessment unit:</u>			
Volume % in entity	_____	_____	_____

ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO GENERAL LAND OWNERSHIPS
Surface Allocations (uncertainty of a fixed value)

1. <u>Federal Lands</u>	represents	<u>13.49</u>	area % of the AU
<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in Gas Accumulations:</u>			
Volume % in entity	<u> </u>	<u>13.49</u>	<u> </u>
2. <u>Private Lands</u>	represents	<u>77.64</u>	area % of the AU
<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in Gas Accumulations:</u>			
Volume % in entity	<u> </u>	<u>77.64</u>	<u> </u>
3. <u>Tribal Lands</u>	represents	<u>0.63</u>	area % of the AU
<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in Gas Accumulations:</u>			
Volume % in entity	<u> </u>	<u>0.63</u>	<u> </u>
4. <u>Other Lands</u>	represents	<u>0.81</u>	area % of the AU
<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in Gas Accumulations:</u>			
Volume % in entity	<u> </u>	<u>0.81</u>	<u> </u>
5. <u>OR State Lands</u>	represents	<u>1.99</u>	area % of the AU
<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in Gas Accumulations:</u>			
Volume % in entity	<u> </u>	<u>1.99</u>	<u> </u>
6. <u>WA State Lands</u>	represents	<u>0.00</u>	area % of the AU
<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in Gas Accumulations:</u>			
Volume % in entity	<u> </u>	<u>0.00</u>	<u> </u>

7. <u>Offshore Oregon</u>	represents	<u>1.63</u>	area % of the AU
<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in Gas Accumulations:</u>			
Volume % in entity	<u> </u>	<u>1.63</u>	<u> </u>
8. <u>Offshore Washington</u>	represents	<u>3.79</u>	area % of the AU
<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in Gas Accumulations:</u>			
Volume % in entity	<u> </u>	<u>3.79</u>	<u> </u>
9. <u> </u>	represents	<u> </u>	area % of the AU
<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in Gas Accumulations:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
10. <u> </u>	represents	<u> </u>	area % of the AU
<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in Gas Accumulations:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
11. <u> </u>	represents	<u> </u>	area % of the AU
<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in Gas Accumulations:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
12. <u> </u>	represents	<u> </u>	area % of the AU
<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in Gas Accumulations:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>

ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO FEDERAL LAND SUBDIVISIONS
Surface Allocations (uncertainty of a fixed value)

1. <u>Bureau of Land Management (BLM)</u>	represents	<u>6.67</u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u>6.67</u>	<u> </u>
2. <u>BLM Wilderness Areas (BLMW)</u>	represents	<u> </u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
3. <u>BLM Roadless Areas (BLMR)</u>	represents	<u> </u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
4. <u>National Park Service (NPS)</u>	represents	<u>0.76</u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u>0.76</u>	<u> </u>
5. <u>NPS Wilderness Areas (NPSW)</u>	represents	<u> </u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
6. <u>NPS Protected Withdrawals (NPSP)</u>	represents	<u> </u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>

7. <u>US Forest Service (FS)</u>	represents	<u>5.71</u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u>5.71</u>	<u> </u>
8. <u>USFS Wilderness Areas (FSW)</u>	represents	<u> </u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
9. <u>USFS Roadless Areas (FSR)</u>	represents	<u> </u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
10. <u>USFS Protected Withdrawals (FSP)</u>	represents	<u> </u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
11. <u>US Fish and Wildlife Service (FWS)</u>	represents	<u>0.26</u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u>0.26</u>	<u> </u>
12. <u>USFWS Wilderness Areas (FWSW)</u>	represents	<u> </u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>

13. <u>USFWS Protected Withdrawals (FWSP)</u>	represents		area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<hr/>	<hr/>	<hr/>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<hr/>	<hr/>	<hr/>
14. <u>Wilderness Study Areas (WS)</u>	represents		area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<hr/>	<hr/>	<hr/>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<hr/>	<hr/>	<hr/>
15. <u>Department of Energy (DOE)</u>	represents		area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<hr/>	<hr/>	<hr/>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<hr/>	<hr/>	<hr/>
16. <u>Department of Defense (DOD)</u>	represents	0.08	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<hr/>	<hr/>	<hr/>
<u>Gas in gas assessment unit:</u>		0.08	
Volume % in entity	<hr/>	<hr/>	<hr/>
17. <u>Bureau of Reclamation (BOR)</u>	represents		area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<hr/>	<hr/>	<hr/>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<hr/>	<hr/>	<hr/>
18. <u>Tennessee Valley Authority (TVA)</u>	represents		area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<hr/>	<hr/>	<hr/>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<hr/>	<hr/>	<hr/>

19. <u>Other Federal</u>	represents	<u>0.00</u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u>0.00</u>	<u> </u>
20. <u> </u>	represents	<u> </u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>

ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO ECOSYSTEMS

Surface Allocations (uncertainty of a fixed value)

1. Klamath Mountains (KLMT)	represents	4.44	area % of the AU
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<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity			

<u>Gas in Gas Accumulations:</u>	
Volume % in entity	4.44

2. Oregon and Washington Coast Ranges (OWCR) represents 27.31 area % of the AU

<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity			

<u>Gas in Gas Accumulations:</u>	
Volume % in entity	27.31

3. Western Cascades (WCSC)	represents	10.12	area % of the AU
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<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity			

<u>Gas in Gas Accumulations:</u>	
Volume % in entity	10.12

4. Willamette Valley and Puget Trough (WVPT)	represents	52.69	area % of the AU
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<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity			

<u>Gas in Gas Accumulations:</u>	
Volume % in entity	52.69

5. _____ represents _____ area % of the AU

<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity			

Gas in Gas Accumulations:
Volume % in entity

6. _____ represents _____ area % of the AU

<u>Oil in Oil Accumulations:</u>	minimum	mode	maximum
Volume % in entity			

Gas in Gas Accumulations:
Volume % in entity

7.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
8.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
9.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
10.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
11.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
12.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
